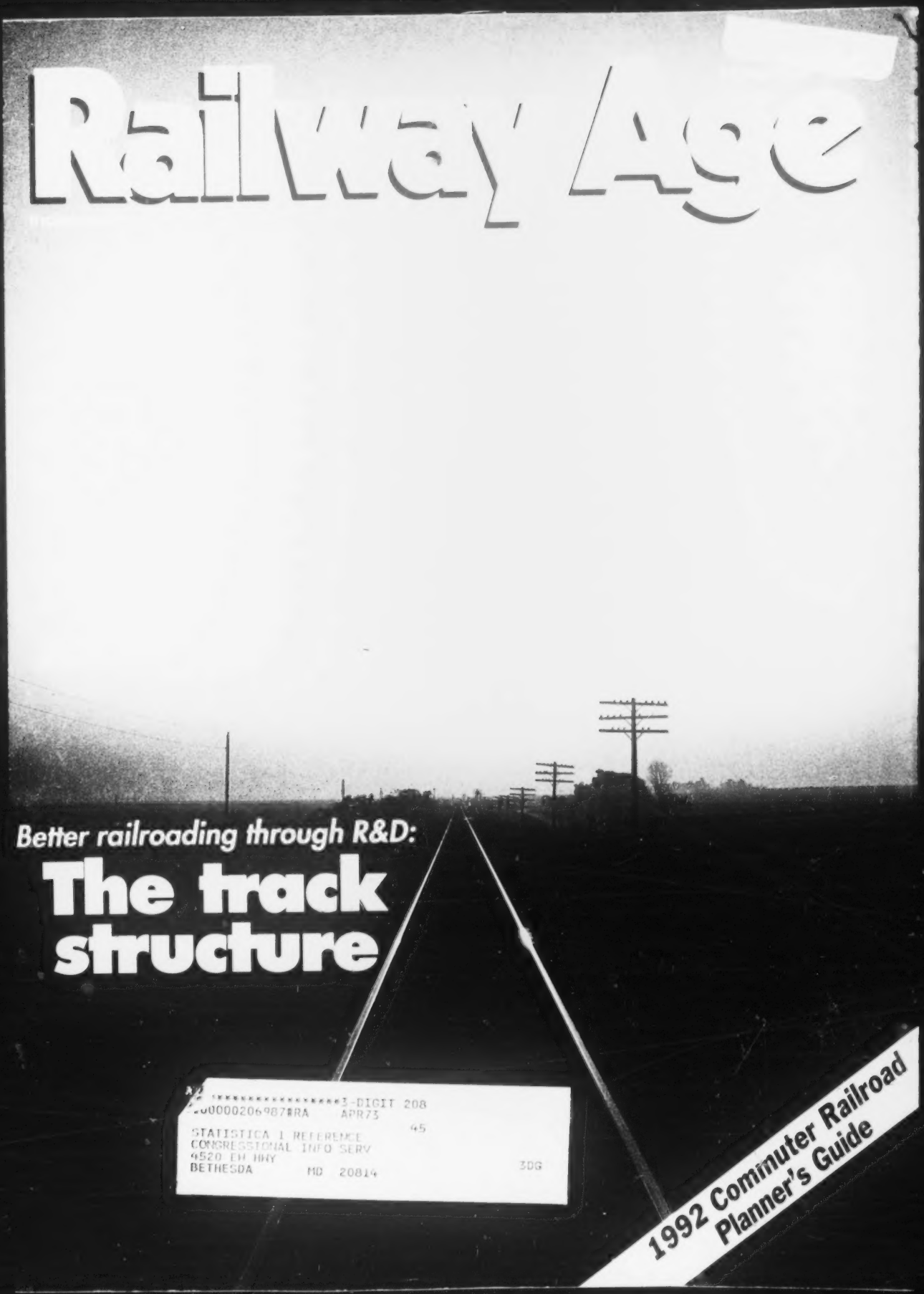
Railway Age



Better railroading through R&D:

The track structure

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1992 Commuter Railroad Planner's Guide

November 1991

Railway Age

Incorporating Modern Railroads

1992 COMMUTER RAILROAD PLANNER'S GUIDE

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Cover photo: Gary Benson

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Market Outlook

Equipment

Amtech: Received initial orders totaling more than $3 million for automatic equipment identification (AEI) tags following the AAR board's Sept. 27 approval of mandatory AEI tagging, to become effective Jan. 1. (*RA*, Sept., p. 22). There will be a maximum implementation period of 30 months ending June 30, 1994, under which all cars and locomotives operating in interchange service in North America must be tagged. Each piece of rolling stock needs two tags. Reader systems must also be installed.

Southern Pacific: Has entered into a three-year $150 million agreement with the Greenbrier Companies for the refurbishment of 9,000 freight cars for SP's newly established "Golden West Service" fleet. Included in the order are boxcars, covered hopper cars, open top hoppers, gondolas for steel and wood chips, mechanical refrigerator cars, and flat cars. Greenbrier President and CEO William A. Furman said the order "means steady employment for about 250 workers at Gunderson and other car shops in Oregon and around the country. It also means Greenbrier and Gunderson are involved in providing a new fleet of high quality rail equipment which will serve important shippers throughout the Northwest and elsewhere."

Facilities

Union Pacific: Placed an order with Video Masters, Inc. for an additional 17 automatic equipment identification (AEI) systems, for a total of 33. Included are stand-alone, hybrid video, and intermodal type systems.

Southern Pacific: Awarded a contract to Morrison Knudsen to design and build a 100,000-square-foot, intermediate locomotive repair facility at Colton, Calif. The project will take around 16 months to complete.

De Leuw, Cather International: Signed a contract with the Kaohsiung Municipal Government, Taiwan, establishing De Leuw, Cather International as general engineering consultant for phase one of the $6.5 billion, 78-km Kaohsiung Mass Transit System. Subconsultants on the project team include Parsons Brinckerhoff International, Electrowatt Engineering Services, KCCT International, and Dames and Moore. First segments of the Kaohsiung system are scheduled to open by 1996.

Honolulu International Airport: Awarded a contract valued at $100.8 million to AEG Westinghouse Transportation Systems for an automated people mover system connecting existing buildings at the airport with two new terminal buildings. AEG Westinghouse has so far installed 12 people mover systems worldwide, nine of them in airports, and has four others under construction.

Conrail: Will build a new, $25 million data center off Roosevelt Boulevard in northeast Philadelphia to replace an existing facility at 15 North 32nd Street and a support facility in King of Prussia. Now under design, the 100,000-square-foot facility will be constructed on land acquired from the Philadelphia Industrial Development Commission. It is to be ready for occupancy in late 1992, housing all of Conrail's large-scale computers, auxiliary equipment, and various communications network monitoring equipment, and employing approximately 200 people.

Revenue freight carloadings

Commodity	Oct. 12 week	Oct. 5 week	Sept. 28 week	Sept. 21 week
Grain	30,109	31,901	29,372	28,562
Other farm products	2,441	3,032	2,505	1,871
Metallic ores	14,193	16,685	18,087	16,983
Coal	131,499	127,570	133,384	132,021
Crushed stone, gravel and sand	15,534	15,003	14,751	14,860
Nonmetallic minerals	9,801	9,720	9,593	9,447
Grain mill products	9,778	9,895	9,937	10,061
Food and kindred products	9,152	9,239	9,460	9,315
Primary forest products	9,316	9,303	9,596	9,259
Lumber and wood products	5,120	5,175	5,999	5,678
Pulp, paper and allied products	9,816	10,196	10,151	10,096
Chemicals and allied products	28,911	28,855	29,038	27,803
Petroleum products	5,275	5,057	5,544	5,150
Stone, clay and glass products	9,654	9,870	9,671	9,777
Coke	5,270	5,365	5,261	5,436
Metals and products	10,770	9,320	11,043	10,200
Motor vehicles and equipment	18,095	17,835	19,593	18,821
Waste and scrap materials	8,768	8,807	8,836	8,892
All other carloads	7,017	7,549	8,318	7,396
Total Cars Loaded	340,519	341,377	350,229	341,718
% change from previous year	.4	(2.6)	2.4	(1.7)

Cumulative total: 41 weeks	13,141,792	% change (5.3)

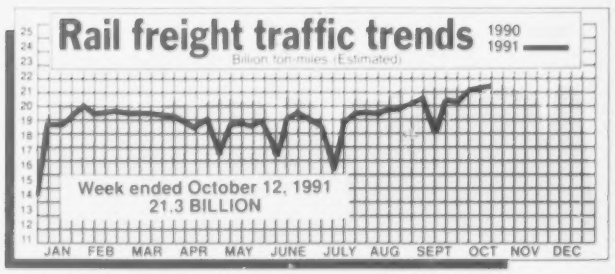
Estimated revenue ton-miles (billions)	21.3	21.2	20.7	20.3
% change from previous year	2.9	1.0	.5	.0

Total:	1991	1990	% change
41 weeks	801.0	816.9	(1.9)

Intermodal traffic

	Oct. 12	Oct. 5	Sept. 28	Sept. 21
Trailers	68,883	70,786	70,740	67,480
Containers	65,442	67,163	64,263	65,681
Total	134,325	137,949	135,003	133,161
% change from previous year	5.2	3.4	3	.8

Cumulative total: 41 weeks	4,843,381	% change (.5)


Rail freight traffic trends
1990
1991
Billion ton-miles (Estimated)
Week ended October 12, 1991
21.3 BILLION
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

Source: Association of American Railroads

1992 Commuter Railroad Planner's Guide

Commuters from train No. 806 from Providence arriving at Boston's South Station. MBTA carries twice as many riders as it did 15 years ago.

How MBTA rebuilt ridership

A massive modernization program and service expansion rebuilt Boston's Commuter rail system into one of the most advanced in America—and ridership more than doubled.

By WILLIAM D. MIDDLETON, Contributing Editor

"To live in the country, the real country, yet be able to attend to one's business in the city, is a dream which modern methods of rapid transit are fast making come true." — Winthrop Packard, in a 1905 Suburban Life article, quoted in "Metropolitan Corridor," by John R. Stilgoe.

In the great heyday of railroad commuting, the availability of economical and convenient commuter trains indeed made it possible for thousands of urban Americans to take up the pleasures of life in the suburban countryside.

Commuter rail services developed out of the growth of America's largest urban centers in the last half of the 19th century, and by the turn of the century railroad commuting between suburban homes and city workplaces had become a commonplace of urban life in such major centers as Boston, New York, Philadelphia, Chicago, San Francisco, and Montreal.

Commuters represented a substantial — and a profitable — business for the railroads for much of the first half of the century. Commuter traffic grew steadily to a peak of nearly 7 billion passenger-miles in 1929, before it began to decline in the face of highway development and the economic decline of the Great Depression of the 1930s. During and just after World War II rail commuting briefly approached the record levels of the 1920s, but soon resumed what seemed to be an unending decline. By this time, too, commuter traffic had become an increasingly uneconomic business for the railroads, and there was little incentive for capital investment in either new equipment or in an increasingly deteriorated infrastructure.

From about 1950 onward, the quality of commuter rail equipment, plant, and service declined steadily, and by 1962 commuter rail traffic was down to a low point of just over 4 billion annual passenger-miles.

But even as commuter rail declined, there was a growing recognition of the value of public transportation alternatives to private automobiles and congested urban highways. Particularly after passage of the Urban Mass Transportation Act of 1964, commuter rail systems began to share in a growing level of public support for mass transportation. Under public support, and then public ownership, commuter rail systems have entered a new era of growth. Equipment has been replaced, existing commuter rail plant has been rebuilt, and new services established. Over the past decade, commuter rail has become one of the nation's fastest-growing transit modes, and by the end of the decade U.S. commuter rail systems were transporting a record annual traffic of more than 7.2 billion passenger-miles.

Among all of America's original commuter rail centers, none saw a more precipitous decline in the quality of its commuter service or in its ridership than that experienced by Boston. Formation of the Massachusetts Bay Transportation Authority (MBTA) in 1964 provided a basis for public support of Boston commuter rail services. Beginning soon after the authority completed acquisition of the Boston commuter rail system in 1976, MBTA initiated a massive program of equipment rehabilitation and replacement, reconstruction of the commuter rail infrastructure, and service expansion that has rebuilt the Boston system into one of the most advanced commuter rail properties in North America. Over the past decade MBTA commuter rail ridership has more than doubled, and the system is now moving ahead with continued development and expansion that should make the 1990s a period of very nearly equal growth.

• A commuter rail pioneer. In that early era of the commuter train, Boston was one of the great centers of North American commuter rail. Indeed, Boston's railroads were among the pioneers in establishing suburban rail services. As early as 1838 the Boston & Worcester Railroad began offering what were probably the first "commuted" fares for daily travel between suburban

MBTA COMMUTER RAIL AT A GLANCE

Number of Routes:	
Northside:	5
Southside:	6
Total:	11
Route Miles:	265
Track Miles:	479
Stations:	101
Stations with Handicapped Access:	35
Total Parking Spaces:	16,000 (approximately)
Number of Locomotives:	72*
Number of Passenger Cars:	348**
Daily Trains	375
Hours of Service (approximately):	5:00 a.m. until 1:00 a.m.
Daily Ridership (1990):	76,360
Annual Ridership (Fiscal Year 1991):	19,855,272
On-Time Performance (1990):	94.2%
Fare Box Ratio (Fiscal Year 1991):	35.55%

Notes:
* Upon completion of current deliveries.
** Upon completion of current deliveries. Excludes 32 M-K rebuilt Budd cars now for sale.

areas and city terminals, giving rise to the term "commuter." The company began operating regular commuter trains between Boston and West Newton in 1843, and by the mid-1850s the Boston & Worcester was carrying nearly a half million annual commuters between their suburban homes and downtown Boston.

By the early years of the current century, Boston's railroads had developed an enormous commuter traffic. By 1913, the city's two downtown terminals were the busiest anywhere in the U.S. At South Station some 850 daily trains of the Boston & Albany and New Haven were handling over 38.4 million annual passengers, most of them commuters, while at North Station some 750 daily Boston & Maine trains carried a largely commuter traffic that totaled more than 29.5 million annual passengers. By 1920, the peak year for Boston's commuter rail services, the three railroads serving the city were carrying close to a quarter of a million commuters every day.

The fortunes of Boston's commuter railroads largely paralleled those of other U.S. commuter lines. Despite efforts to introduce more economic equipment in the early 1950s, notably through extensive use of rail diesel cars, traffic continued to decline and commuter services became increasingly uneconomic for the railroads. By 1959, after closure of the New Haven's former Old Colony lines serving points southeast of Boston, commuter rail ridership had hit a 90-year low.

A Mass Transportation Commission established by the state in 1959 recommended improved commuter services at lower fares, with subsidies to be provided through an expanded Metropolitan Transportation Commission. This new Massachusetts Bay Transportation Authority, established in 1964, was empowered to provide public transportation throughout the Boston metropolitan area, with an ability to contract to provide commuter service to communities outside this area. Over the next several years, MBTA began subsidizing Boston commuter services under contracts with the railroad companies. In 1972, the authority acquired Penn Central commuter properties reaching south and west from Boston, followed by purchase of the Boston & Maine's extensive commuter rail system north of Boston at the end of 1976.

By the time this consolidation of the entire Boston commuter rail system under

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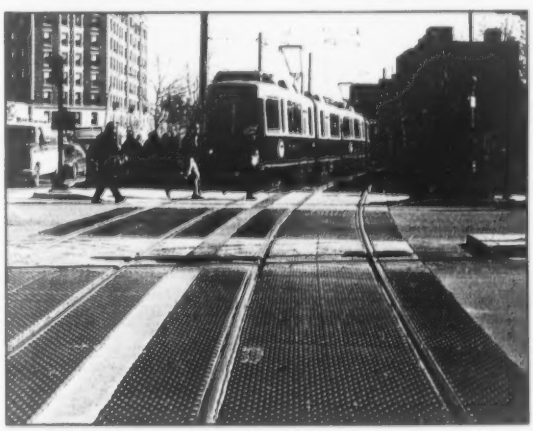
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MBTA ownership was completed, both equipment and plant were in an advanced state of deterioration. Except for the sizable fleet of rail diesel cars acquired in the 1950s, most commuter rolling stock was long overdue for replacement. Because of poor track condition, most commuter lines had severe speed restrictions, and some required emergency repairs to allow temporary safe passage of trains. Main line derailments were common, and on-time train performance was down to only 78%.

With the full Boston commuter system firmly under MBTA control, the Authority began a massive program of equipment replacement and rehabilitation, as well as a comprehensive rebuilding of the commuter rail plant that is now more than a decade along.

Principal funding for this capital program has come from a combination of Federal grants through UMTA with state funds generated from a series of transportation bond issues. A total of $2.6 billion in state funding for MBTA has been provided through these bond issues since 1983, with $842 million of that total allocated to commuter rail projects.

• Rebuilding the infrastructure. Reconstruction and improvement of fixed plant was clearly one of the most pressing tasks that faced MBTA when it assumed ownership of the Boston commuter rail system. Maintenance operations were reorganized and modernized with a major investment in "state of the art" equipment, and the entire commuter rail fixed plant was inventoried and its condition assessed to form the basis for a capital investment program intended to provide the Boston area with an advanced commuter rail system. From this effort MBTA evolved a three-phase program that provided first for immediate needs, second for renewal of all worn out or technologically obsolete systems and components, and, finally, investments that would expand system capacity and improve the attractiveness of commuter rail services.

Track rehabilitation represented one of MBTA's most urgent tasks. Through the end of 1990, the authority had laid some 372 miles of cwr, replaced more than 750,000 cross ties, installed some 650,000 tons of ballast and cleaned ballast on more than a hundred miles of track, resurfaced and realigned track throughout the system, and surface ground hundreds of miles of rail. Over 200 turnouts were renewed, and some 26,000 switch timbers replaced. A track geometry car was acquired to perform quarterly quality control tests for all track. Culverts and retaining walls were renewed, drainage ditches were cleaned, brush was cleared, and more than a hundred grade crossings rebuilt.

Structures have come in for similar attention. Bridge projects have included 24 replacement structures, among them a 1628 foot fixed span replacement for a drawbridge crossing of the Mystic River at Everett, and the rebuilding of 54 bridges, including three major drawbridge spans. Signaling and train control work included the installation of six new train control machines and over 200 miles of new TCS signal system, the instal-

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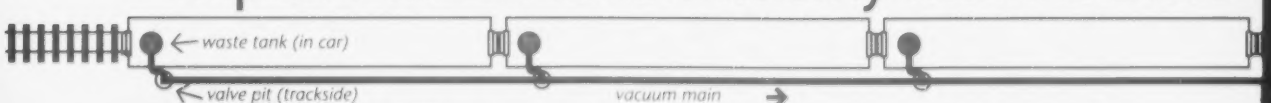

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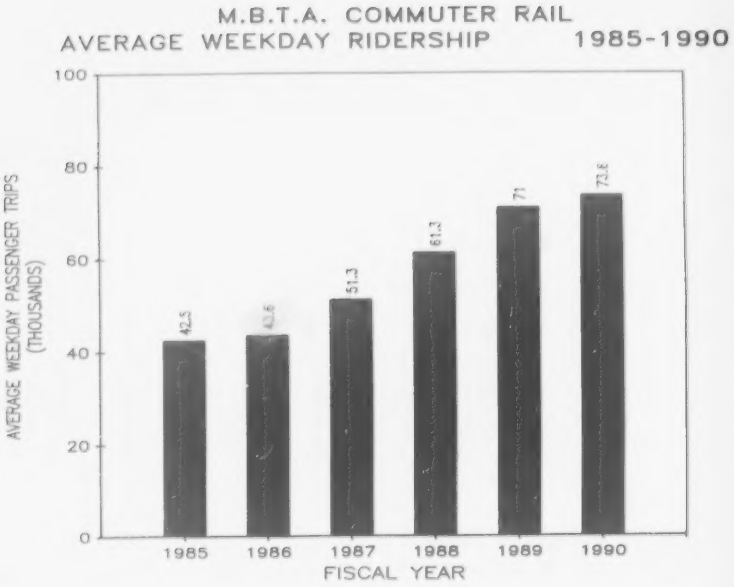
The wastewater from the cars is transported through the vacuum main to the vacuum central where it can be automatically pumped to a treatment plant or a gravity sewer.



lation of automatic gates or signals at more than 100 grade crossings, and extensive replacement and renewal of existing interlocking and signaling cable and plant.

Station and terminal facilities have been upgraded throughout MBTA's commuter rail system. Some 24 new stations have been built, and more than 60 have been rebuilt with such improvements as lengthened platforms, new lighting, canopies, and other amenities, while handicapped access improvements have been completed at more than a third of the system's commuter stations. Thousands of new park-and-ride spaces have been completed.

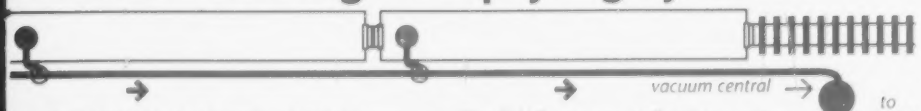
Station improvements for T commuters have included such major facilities as a new intermodal terminal and parking garage at Lowell, and a new bus-rail station at Salem. Late this year, MBTA and the city of Lynn are completing a new $48 million multimodal transportation center at Central Square in downtown Lynn that includes a 1,000-car parking garage, terminal facilities for 13 bus routes, and even provision for connection with a future extension of MBTA's Blue Line rapid transit route, as well as commuter rail facilities.

Both of MBTA's downtown Boston commuter rail terminals are undergoing a comprehensive rebuilding into modern transportation centers.

Furthest along is the South Station Transportation Center, where a multi-phase project is transforming the once dilapidated 1899 terminal into a modern multi-modal transportation and commercial center that is already spurring redevelopment of the once declining downtown area around the terminal. Already complete is a $25 million project that provides a direct link to an enlarged Red Line subway station adjacent to the terminal. Also complete is a $49 million Phase 1 South Station project that included reconstruction and extension of the original 1899 head house to provide new passenger facilities for both MBTA and Amtrak, and more than 100,000 square feet of office and retail space. The work also included 11 new terminal tracks with high level platforms, and foundation work for planned Phase 2 air rights development over the terminal.

Construction should begin next spring for a $75 million second phase of the South Station project that includes a terminal for in-

vacuum sewage emptying system.



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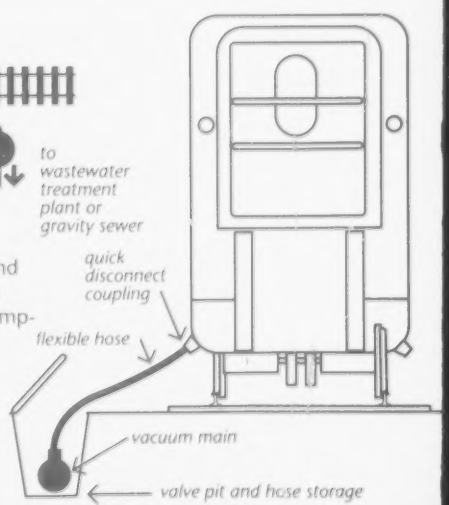

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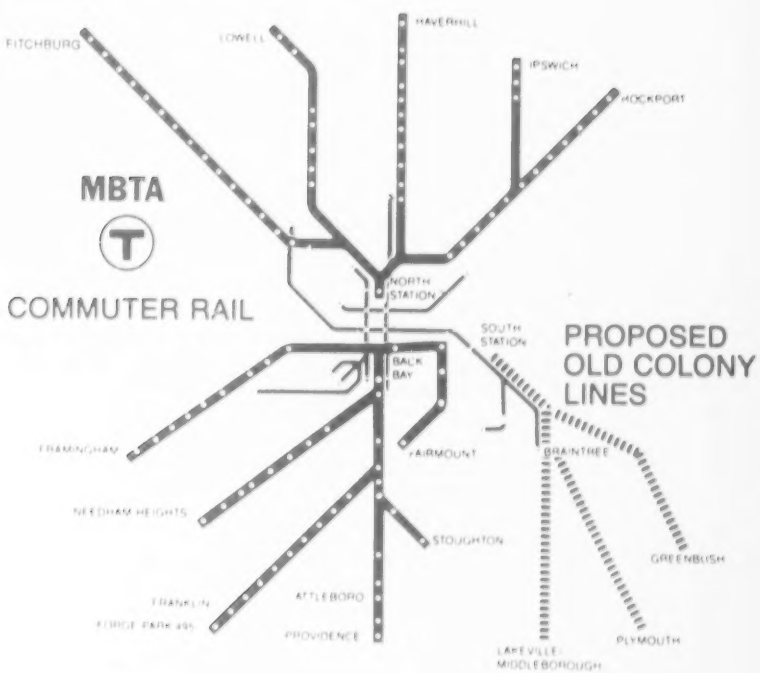
tercity, commuter, and Logan Airport express busses on a first air rights level above the tracks, and a second level that will provide parking space for 215 cars. Ramps will link the bus terminal and garage to surrounding city streets and highways, and to the city's planned new Central Artery/Third Harbor Tunnel project. Other work will include an additional terminal track and platform to accommodate the planned expansion of MBTA commuter rail service to the Old Colony lines, a park on the west side of the station, and an enclosed pedestrian connector linking the rail and bus terminals. The City of Boston and its Boston Redevelopment Authority hold air rights for still another planned phase of work above the Phase 2 project. Original plans called for four levels of additional parking and a 600-room hotel, but the city has now selected Tufts New England Medical Center as the developer for a bio-technology center project in the air rights site.

Work began in 1990 for a $300 million project of similar magnitude that will transform MBTA's second Boston terminal into a new North Station Transportation Center. Already complete is the construction of high level platforms and two additional terminal



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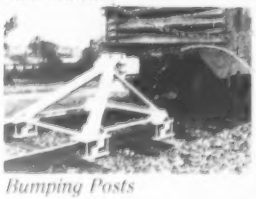
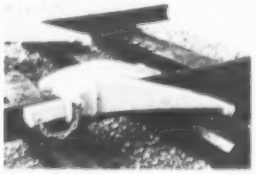
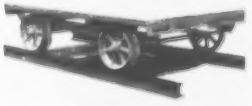

Bumping Posts

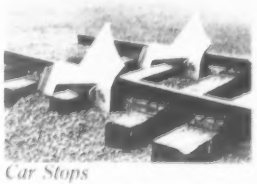

Rerailers

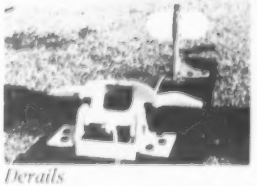

Push Cars

Cast Replacement Wheels

Derails

Wheel Chocks


Car Stops


Derails

Blue Flags

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tracks, while work is in progress on the top-down construction of a five-level, 1,300 car parking garage just to the rear of the existing Boston Garden structure that should open in June 1993. The work includes the construction of deep-core caissons for air rights development of a planned new Boston Garden arena that will replace the old facility. The project also includes the demolition of the Green Line light rail elevated structure adjacent to North Station and relocation of light rail trains into a new subway alongside the existing Boston

Garden site and through the parking garage. A new "super station" beneath North Station will provide both Orange Line rapid transit and Green Line trains with a direct connection to MBTA commuter trains.

By far the largest single MBTA infrastructure project to date has been the $750 million Southwest Corridor project completed in 1987, which provided a new high speed entry into Boston for both MBTA commuter rail and Amtrak trains, as well as a new alignment for MBTA's Orange Line rapid transit route. Funded from Interstate Transfer funds generated through cancellation of an I-95 expressway project, the 4.7-mile line was constructed over an eight-year period from 1979 through 1987. Replacing the old New Haven Shore Line embankment on substantially the same alignment, the Southwest Corridor provided a fully grade separated, depressed three- track right-of-way for commuter and Amtrak traffic, in addition to the double-track Orange Line. Track is laid with cwr on concrete ties. New stations at Forest Hills and Ruggles serve commuter rail trains, while a new Back Bay station serves both commuter and Amtrak trains.

In addition to rehabilitating the commuter rail operating infrastructure, MBTA is also upgrading its commuter rail support facilities. New maintenance of way facilities have been completed at Salem and Readville, and a 36,000 square foot coach service building was constructed to support MBTA's Northside lines.

Just last month, MBTA completed its largest support facility to date, a $31 million inspection and service facility for its Southside commuter rail fleet. Located at Five Yard near South Station, the 59,000 square foot structure provides complete facilities for train washing, interior cleaning, fueling, sanding, inspection, and light running repairs, replacing outdoor servicing facilities and reducing the need for a circuitous transfer of equipment to MBTA's principal commuter rail maintenance facility, the Boston Engine Terminal located in Somerville on the Northside system. The new shop facility can accommodate a nine-car train and locomotive on each of its two tracks, and can complete the entire inspection and service process for a train in just 45 minutes.

Tracks are mounted on pedestals, with an inspection pit between the rails, through the full length of the shop, while a full length platform at car floor height provides access for car servicing and cleaning. A drop table serviced by a 10-ton crane is available for changing wheel sets at one end of the facility. Anticipating that the MBTA commuter rail equipment fleet will increase by more than half over the next two decades with the restoration of Old Colony Line service, the shop is expandable to three tracks.

Slated for construction later in the 1990s will be a replacement for the antiquated Boston Engine Terminal, which represents MBTA's principal commuter rail maintenance base.

• Expanding the network. In addition to rebuilding the commuter rail infras-

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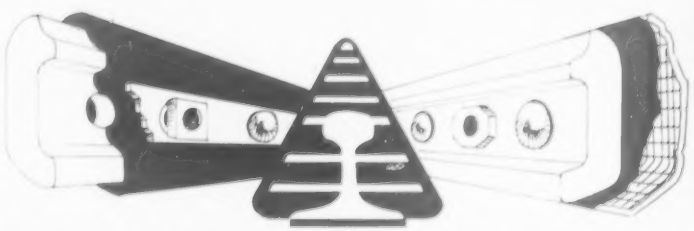

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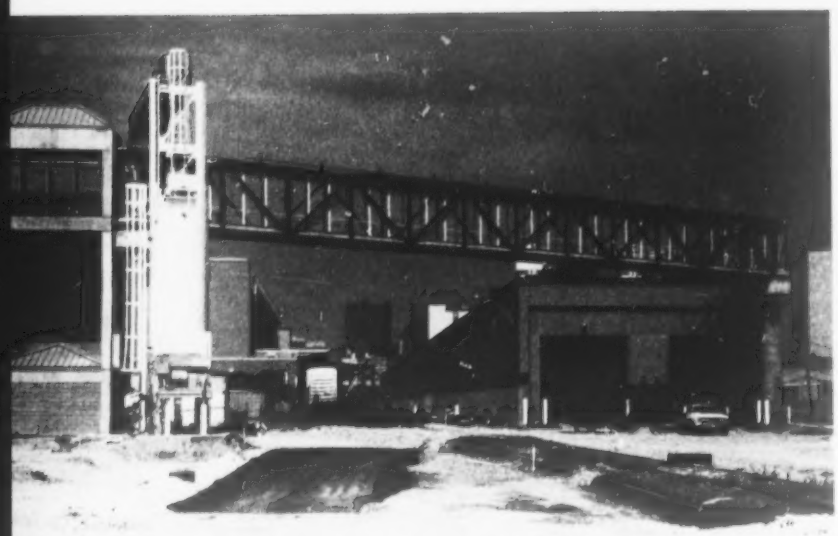

New Commuter Rail Maintenance Facility at Five Yard in South Boston was built at a cost of $35 million. Design engineer was STV/Seelye Stevenson Value & Knecht.

tructure, MBTA has restored or extended service on several of its routes both north and south of Boston during the 1980s. On the Northside lines, service was extended 21 miles north from Reading to Haverhill, and 24 miles northwest from South Acton to Fitchburg. On the lines south of Boston service was extended 12 miles south from Attleboro to Providence, R.I., on the Boston-New York main line shortly after opening of the new Southwest Corridor, while in 1988 Franklin Branch service was extended 3 miles to serve a new 382-acre mixed-use commercial, industrial and residential development at Forge Park/Interstate 495. An entirely new route was added to the Southside lines following opening of the Southwest Corridor in 1987, when a service was established between South Station and Readville via the 9- mile Midland Branch. The route had been upgraded as a temporary route for MBTA and Amtrak trains during Corridor construction.

• A new equipment fleet. MBTA entered the commuter rail business with a varied collection of motive power and rolling stock inherited from its predecessor companies that included well-used diesel- electric locomotives, a substantial fleet of cascaded main line passenger cars, and an aging fleet of nearly 100 Budd RDC's.

This initial equipment fleet was substantially altered beginning in the late 1970s as MBTA began a shift to locomotive-powered push-pull trains as its basic operating mode.

During 1978-80 MBTA acquired 19 rebuilt 1,750-hp EMD F units and 18 new 3,000-hp EMD F40PH units, equipped for head end power and push-pull operation. At the same time, a basic standard for MBTA commuter coaches was established by a 60-car order supplied by Pullman-Standard in 1979. These single level, aluminum cars were outfitted with 2-2 seating for 95 or 99 passengers, and were divided between 15 control trailer and 45 mid-train units for push-pull operation. At the same time, MBTA began a conversion of its RDC fleet for operation as non-powered units in push-pull train sets. Many of the Budd cars were operated in locomotive-hauled trains with limited modifications, while 32 RDCs were fully rebuilt by Morrison Knudsen in 1982 as control trailer or mid-train units.

Supported by the state's transportation bond issues, MBTA has completed the acquisition of a substantial new commuter rail motive power and rolling stock fleet over the past five years, both to accommodate a ridership growth that averaged 15% annually through 1985-1990 and to permit the replacement of its older rebuilt locomotive and passenger car fleet.

During 1987-88, MBTA acquired another 26 new EMD F40PH-2 locomotives, while this year Morrison Knudsen is completing the delivery of an order for nine rebuilt F40PH-2M units, one of which is a replacement for an F40PH unit wrecked at Back Bay last year. Locomotives delivered under these two most recent orders are equipped with separate engines for head end power, affording both quieter operation and greater fuel efficiency.

More than 200 additional single-level, push-pull coaches were added to the MBTA fleet between 1987 and 1990, adding 24,500 seats to MBTA's commuter rail capacity. West Germany's MBB supplied a total of 67 units in 1987, while Bombardier supplied 147 cars, essentially identical to MBTA's earlier Pullman-Standard units, in three orders delivered between 1987 and 1990. For all three Bombardier orders, the Authority shifted to a 3-2 fixed seating configuration accommodating 122 or 127 passengers.

Confronted by continuing traffic growth, and with its maximum train length limited to nine cars by current platform lengths, MBTA has shifted to double deck equipment for its most recent rolling stock acquisition in order to expand peak period train capacity beyond that possible with single level coaches. A fleet of 75 double deck cars now being delivered by Nissho Iwai, Inc. and Kawasaki, Inc. of Japan will each seat either 175 passengers in control trailers, or 185 passengers in a mid-train trailer unit, with a fixed 3-2 seating configuration. The new double decker fleet will add another 13,625 seats to the MBTA commuter inventory.

Constructed with a stainless steel car body shell, with low alloy high tensile steel end undertrames, the new cars are 85 feet 4 inches long, and 15 feet 6½ inches high.

Specifications for the cars, ordered in 1989, were developed by Seelye, Stevenson, Value and Knecht after extensive clearance and configuration studies. Requiring a car that can load and unload from either high- or low-level platforms, sometimes from both levels at the same time, MBTA selected a design with conventional end vestibules with wide single stream sliding doors and manually operated trap doors. Steps at each end lead to the upper and lower levels, and handicapped accommodations are provided at platform level at the No. 2 end. The new cars have also achieved a significant tare weight reduction for each passenger carried. A double decker mid-train trailer weighs just 681 pounds per seated passenger, while the most recent comparable single-level cars weigh 733 pounds per seated passenger.

Completion of double decker deliveries will provide MBTA with sufficient capacity both to meet projected traffic growth, and to permit retirement of the last of its rebuilt Budd RDC's from service.

MBTA's next major equipment project will be a mid-life overhaul of its initial 1979 Pullman-Standard car fleet, which is now approaching 12 years of service. The Authority expects to advertise for bids for the overhaul program by next spring.

• Enhancing intermodal access. Most commuters do not walk from their homes to the train, and most don't walk from the train to their place of work either. Rec-

ognizing this, MBTA has made enhancement of intermodal access between its rail services and both automobile use and public transit an integral part of the rebuilding of the Boston commuter rail system.

Intermodal access usually means plenty of parking at the suburban end of the commuter journey, and the expansion of park-and-ride facilities has been a key part of MBTA's program for the improvement or replacement of its suburban stations. The commuter rail system now has a total of some 16,000 park-and-ride spaces, with still more planned.

MBTA also has greatly improved access between commuter rail and the Authority's own surface transit routes. Convenient T bus connections, with coordinated schedules, are available at virtually every commuter rail station within the 78 cities and towns that make up MBTA's service district. The Authority works with other transit operators, as well, to provide equally good connections and coordinated schedules at its outlying stations outside the MBTA service district.

The T's improvement programs of the past decade have done much, too, to provide more direct and convenient access between commuter rail stations and MBTA's urban rail transit system. The Northwest Extension of the T's Red Line completed in 1984-85 included a link with the North Side commuter rail route to Fitchburg at Porter Square, while an earlier relocation of the north end of the Orange Line added a connection with the Haverhill commuter rail line at Malden Center.

The Southwest Corridor project completed in 1987 affords a model example of the intermodal integration of commuter rail with rapid transit and surface transit services, and with automobile usage. The 4.7-mile project included both a new high-speed entry to Boston for Amtrak and commuter trains, and tracks for a relocation of MBTA's Orange Line rapid transit route, with connections between Orange Line and commuter rail trains available at the Back Bay, Ruggles, and Forest Hills stations. T bus connections are available at every commuter rail station, and the planned restoration of service on the Arborway route will provide a connection to the Green Line light rail system at Forest Hills.

Reconstruction of MBTA's Boston commuter rail terminals is providing improved rail transit links as well. Already complete is the construction of a new Red Line subway station and connecting link at South Station, while a new subway station now under construction at North Station will provide direct commuter rail links to both the Orange and Green Line rail systems.

Connections with intercity rail services on Amtrak's Northeast Corridor and Springfield lines are available at MBTA's South Station, Back Bay, Framingham, Route 128, and Providence commuter rail stations.

While MBTA has not yet developed a fully integrated fare structure for its commuter rail and transit services, the Authority's monthly commuter rail passes do permit free transfer between commuter rail and other T transit services.

- **Access for the disabled.** Like all other public transit agencies, MBTA is faced with the need for a major effort that will be required to make its commuter rail services fully accessible to the handicapped. This need has been recognized as a fundamental part of MBTA's rebuilding program for Boston's commuter rail system, and substantial progress towards a full accessibility goal has already been made.

Initially, MBTA adopted a 35-foot mini-high platform as the basic means for pro-

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viding handicapped access. Typically, these are located at the country end of platforms, positioned so that the first pair of adjacent doors of an outbound train can be spotted opposite the high platform. More recently, the Authority has adopted full length high platforms as its standard for new or rebuilt stations. Even before this, all three new stations constructed as part of the Southwest Corridor project, and the rebuilt Boston terminals at North Station and South Station were built with full-length high platforms. Altogether, more than a third of MBTA's 101 commuter rail stations are now accessible to the handicapped, with access improvements planned for still more. With the exception of only a few locations, stations on the T's Attleboro, Stoughton, Needham, Rockport, and Ipswich lines are now fully accessible to the disabled.

Starting in 1982, MBTA began equipping its coaches with a lightweight hinged boarding plate to span between the car and platform for handicapped passenger boarding, and all of the Authority's new equipment ordered since then has been outfitted with accommodations for the handicapped. The 75 Kawasaki double deck cars being provided under the most recent rolling stock order, for example, are provided with two wheelchair tiedown positions in the mid-level platform height compartment at each end of the car.

• **New ideas in fare collection.** Thus far, MBTA has continued to employ a conventional, non-automated fare system, with train crews responsible for on-train fare collection. Tickets are sold at major terminals, at some 30 ticket agencies at or near stations, and on board trains. One-way and 12-ride tickets and monthly passes are available, as well as special fares for children, students, and senior citizens. Fares are based on a zone system, with eleven fare zones in addition to two terminal zones.

MBTA's monthly commuter passes, which also provide access to the T's rapid and surface transit system, offer significant savings for regular riders.

"More and more people are beginning to realize what a bargain it is," says John F. "Jack" Flaherty, chief transportation officer for MBTA commuter rail, "and more than 60% of our commuter rail riders are now using monthly passes."

"Even so," says Flaherty, "about $9 million a year in revenue is still picked up by our train crews."

It is this volume of on-board fare collection, together with the relatively short distances between most commuter rail stations, that sets the size of train crews, and MBTA is looking for fare collection alternatives as

a means of significantly reducing its operating costs.

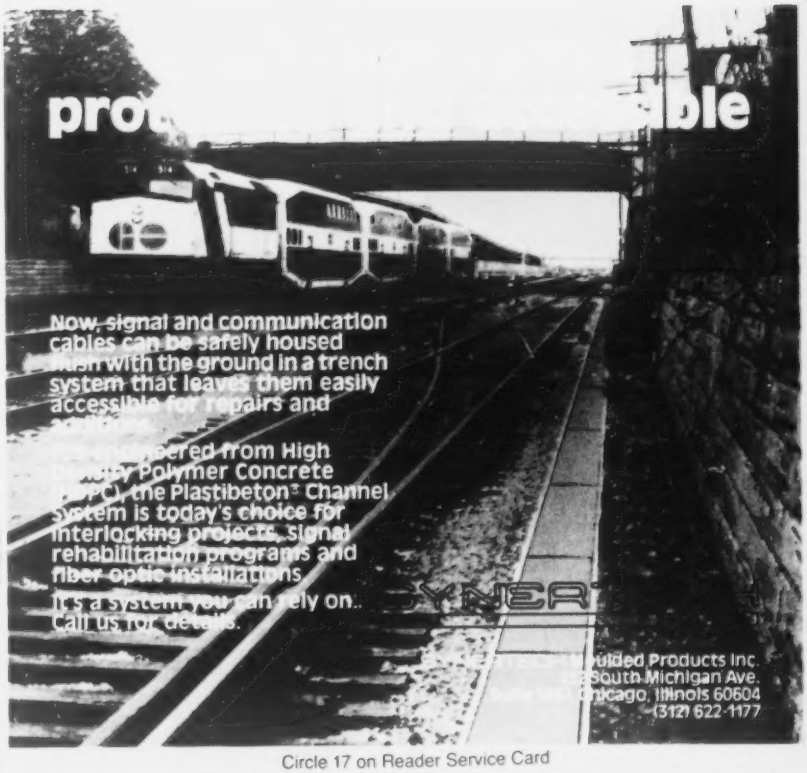
One such alternative recently tried was a one-way only fare collection experiment, much like the system now common for toll bridges, tried for more than a year on the Framingham and Lowell lines. Round trip fares were collected on inbound trips, while there was no fare collection on outbound trips. By reducing crew sizes in the "free" direction, MBTA estimated that it could save $50,000 annually on each line in train crew overtime costs. The experiment, which ended Sept. 1, produced the estimated cost savings without any loss of ridership. But MBTA also found that traffic increased by 7% to 8% in the "free" direction, and one reason for ending the experiment was to see if revenue from this increased ridership can now be captured.

A next step in MBTA's efforts to find a more economical approach to fare collection will be a system-wide study by consultant J. W. Leas & Associates that will consider both the current fare structure and the feasibility of proof-of-payment/barrier-free fare collection and other possible alternatives. The objective for MBTA commuter rail, says Jack Flaherty, will be to "get revenue collection off the train."

● **Marketing the service.** With a double digit commuter rail ridership growth rate that has followed close on the heels of improvements to the quality and capacity of the service, MBTA has not had to make a major effort to market the service. Consequently, MBTA's marketing efforts for commuter rail have thus far been limited primarily to the promotion of services operated for special events.

Typical of these services, for example, is the T's special "Fenway Flyer" service operated during the baseball season to Yawkey Station, adjacent to Fenway Park on the Framingham line, with a return service following each game. Operated from the Framingham, Attleboro, and Franklin lines, the "Flyer" service transported more than 58,000 baseball fans during the 1990 season. In the Fall, a similar service is operated from South Station to carry pro football fans to and from every New England Patriots home game at Foxboro Stadium, which is located adjacent to the Attleboro line. Still other special services are operated for circuses and other major special events.

But under plans being put forth by Massachusetts Secretary of Transportation and MBTA Chairman Richard L. Taylor, this limited marketing effort should soon give way to a major program. Anxious to develop additional revenues for the Authority, Taylor is committed to allocating the re-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sources needed for a significant effort to improve marketing of the Authority's transportation services through both television and print media.

"With this kind of a marketing effort," says commuter rail chief transportation officer Jack Flaherty, "we should see a new era on the MBTA."

• **Contract operation by Amtrak.** In the mid-1970s, as MBTA shifted from the provision of subsidies to the railroads that operated Boston commuter services to outright ownership of commuter rail equipment and plant, the Authority contracted with the Boston & Maine to operate the service. B&M operation continued through 1987, when a renewal of the contract went to Amtrak.

In addition to operation, the Amtrak contract includes maintenance of equipment and plant, except for the Attleboro and Framingham lines, which are maintained directly by Amtrak and by Conrail, respectively. The three-year contract, which is renewable on an annual basis, has been bringing in some $60 million to $70 million annually in gross revenues for Amtrak.

With the shift in operating contractors, MBTA achieved several important improvements to its contract provisions. One of the most important was a provision for incremental performance incentives, under which Amtrak receives additional payments for monthly on-time performance between 91% and 100%. Conversely, the contract provides for penalties for on-time performance below 89%. With an on-time performance level well above the incentive threshold, Amtrak has been earning as much as $2 million annually in performance incentives.

Other important changes that have come with the Amtrak contract have significantly reduced MBTA's train crew costs. The Amtrak contract, for example, deleted a previous mileage agreement under which engineers were paid overtime for service above 100 miles a day, while conductors were paid overtime for service above 150 miles. Under the Amtrak contract, no firemen are required, and train crews can be limited to only two for trains up to six cars, with one additional collector for a train of up to nine cars. Because of fare collection requirements, however, MBTA has not yet been able to take full advantage of these provisions.

• **Positive results.** If the task of rehabilitating Boston's commuter rail system is still far from over, MBTA has achieved some notable results.

MBTA's substantial investment in new equipment and plant rehabilitation permits an overall quality of service that is far superior to that provided by the worn out systems inherited by the Authority in the mid-1970s. Overall schedule speeds have been significantly improved, and service reliability has climbed from the dismal 78% on-time performance of the mid-1970s to a 1990 fiscal year high of 94.2%.

All of this has contributed to the phenomenal ridership gains achieved by MBTA's commuter rail system. In just 13 years, daily ridership increased by more than 150% from a 1977 level of just over 30,000 passengers to a 1990 level of well over 76,000.

MBTA has made some significant progress in its financial results, as well. The system's operating cost per train mile, for example, was reduced by almost 11% in the six years from fiscal year 1986 to 1991, and the fiscal year 1991 cost of $23.24 per train mile was some 8% below that of ten years earlier. Although it still has far to go to reach its goal of a 70% farebox recovery ratio for commuter rail, the T has made some appre-

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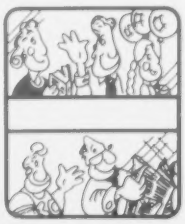

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ciable progress, with a steady improvement from a 1981 recovery ratio of less than 22% to a fiscal year 1991 ratio of almost 36%.

• A coming decade of growth. With a number of major system expansion projects in prospect, MBTA commuter rail can look forward to another decade of growth and development.

Chief among MBTA's projects for the 1990s will be the Old Colony Railroad Rehabilitation Project, which will restore commuter rail service over the former Old Colony lines serving the south shore communities southeast of Boston that now represent the only metropolitan Boston area without commuter rail service. Since Old Colony service was ended by the New Haven Railroad in 1959, traffic on the city's Southeast Expressway has reached a daily count of 150,000 vehicles, double its intended capacity. At the same time, traffic on MBTA's Red Line rapid transit route, which reaches Braintree, has reached a near capacity level of 189,000 riders.

Restoration of service was recommended by a 1984 feasibility study, and MBTA is now moving ahead with a $560 million project that will provide commuter service over three Old Colony lines linking Boston's South Station with Middleborough, Plymouth, and Greenbush. Funding for the work is divided equally between federal grants and state funding from transportation bond issues. Work on the project will include reconstruction of some 82 miles of track, construction of passing tracks and layover facilities, installation of crossing protection, construction of 21 stations, and rebuilding or repair of numerous bridges.

Work will begin first on the Middleborough and Plymouth lines, where environmental impact studies are complete, while wetlands questions and other environmental concerns will delay a start to work on the Greenbush line. The project's first construction should start by spring with the rebuilding of the Neponset River bridge near Quincy and other bridge repairs. Service to Middleborough and Plymouth is expected to begin in 1996, while the Greenbush line should open a year later. Traffic projections for the Old Colony line anticipate that the service will be carrying about 13,000 riders daily by the year 2000.

MBTA anticipates a requirement for 14 new locomotives to operate Old Colony service, and expects to place an order about two and a half years prior to the opening date for the service. Additional passenger cars may be required as well, dependent upon the rate of traffic growth elsewhere on the T commuter system, and the Authority plans to assess its needs at about the same time a locomotive order is placed.

Although capital funding is not yet in place for the work, the balance of the decade could see service extensions on as many as six of MBTA's commuter routes as well. Furthest along is a projected 10-mile extension of Northside service from Ipswich to Newburyport. Environmental studies and preliminary design are already complete, and final design is now in progress. Design engineers have been selected for conceptual design and environmental studies for extensions of Southside service 23 miles west from Framingham to Worcester, and some 37 miles south from Stoughton to New Bedford or Fall River. Another Southside project likely to go into design early in 1992 is a spur from the Franklin line to Foxboro Stadium. Still other extensions that have been studied over the past several years include an 11-mile southward extension of the Franklin line to Bellingham and Milford, and a 10-mile extension northward from Lowell to Nashua, New Hampshire.

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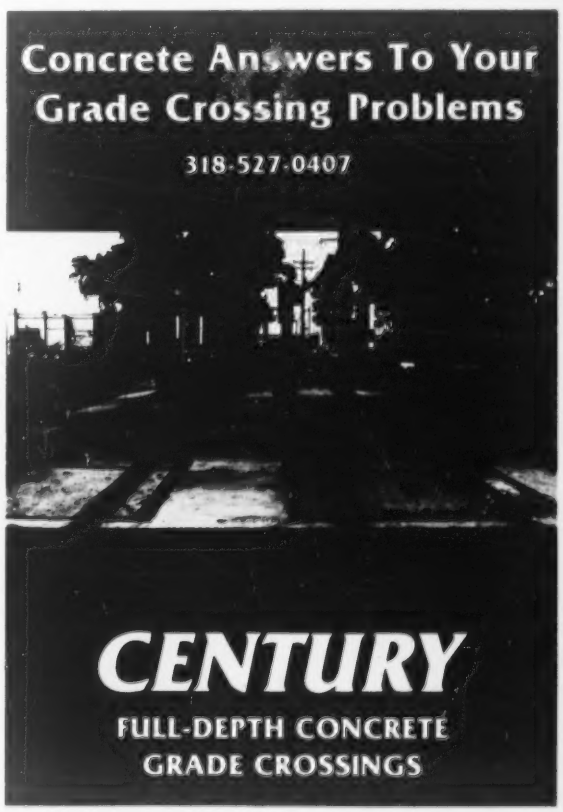

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A major Boston transportation project likely to have at least short term implications for MBTA commuter rail is the $5 billion Central Artery/Third Harbor Tunnel project which will disrupt downtown Boston for the next decade as contractors replace the Interstate 93 elevated structure through the central business district with a new below ground Central Artery, and build the access roads and a new tunnel that will provide a third crossing of Boston Harbor. MBTA anticipates that the impact of all this construction on road transportation will shift a substantial volume of commuter travel to rail, and the T's recent equipment acquisitions have anticipated this extra traffic."

"We see our recent equipment acquisition and rehabilitation as critical to meeting the demand on public transportation during this period," says MBTA's Jack Flaherty.

The Central Artery project could have longer term implications for MBTA commuter rail, as well, if a move to add a rail link between North and South stations to the project is successful. Rail passenger advocates have proposed that the rail link should be built as part of environmental mitigation efforts that accompany the highway project. This could take the form of either a rail line integral with the below grade highway or one on a separate alignment. In addition to allowing a direct link between northern New England points and the Northeast Corridor for long distance Amtrak services, the proposed project would provide a direct link between MBTA's North- and Southside commuter systems, now joined only through a circuitous route via Cambridge, that could facilitate equipment moves between the two systems or permit through routing of some trains. The idea of a link between the two stations will get a closer look as part of a broader study of the state's rail transportation needs recently announced by Transportation Secretary Richard L. Taylor. Consultants will develop the two-year study.

Still another opportunity for major change to the MBTA commuter rail system lies in Amtrak plans to complete electrification of the Northeast Corridor by 1995. The extension of Amtrak catenary from New Haven to Boston would permit MBTA to electrify its heaviest commuter service, the 44-mile route which operates in the Northeast Corridor between South Station and Providence. This one line generates a daily ridership of more than 20,000 passengers, well over 20% of MBTA's total traffic.

If MBTA has made no firm plans to electrify, the Authority has made sure that it can readily make the change when the time does come. Design work for the Southeast Corridor, for example, included provision for the later installation of overhead catenary. MBTA has asked Amtrak to allow for a future T electrification in their plans, and has agreed to finance the additional costs needed to provide adequate capacity for future MBTA needs in Amtrak's fixed electrification plant. And the design of the new Southside maintenance and inspection facility just completed by MBTA included the provision of platforms for locomotive pantograph service and inspection, just in case the facility takes on electric locomotive maintenance in the future.

The prospects for normal traffic growth on the current MBTA system, as well the new traffic that will come with the opening of the Old Colony and other new lines, combined with all of these other prospective changes to the system, promise to make the next decade an active one for Boston's commuter rail system.

"We're planning for it, we're gearing up for it," says MBTA's Jack Flaherty. "We see ourselves being pretty busy over the next ten years." ■

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